REMARKS

Claims 1, 3-17 and 19-54 are presented for further examination. Claims 1, 17, 33 and 40 are currently amended. In view of the foregoing amendments and the following remarks, reconsideration and allowance of the above-reference application are respectfully requested.

Drawings

The Office objected to the drawings for failing to show every feature specified in the claims. Independent claims 1, 17, 33 and 40 are currently amended to address this issue. Accordingly, the drawings are in accordance with 37 CFR § 1.83.

Claim Rejections Under 35 U.S.C. § 112, ¶ 1

Claims 1, 3-17 and 19-54 stand rejected under 35 U.S.C. § 112, ¶ 1 as allegedly failing to comply with the written description requirement. Independent claims 1, 17, 33 and 40 have been amended. Accordingly, reconsideration and withdrawal of the claim rejections are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-17 and 19-54 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Takahashi patent (US 6,665,439) in view of the Westman et al. reference, the Huang et al. patent (US Patent No. 5,671,290), the Noda et al reference (Pub No. US2002/0030634), the Curtright et al. patent (Patent No. 5,844,570), the Prakash et al. patent (US Patent No. 6,778,698), the Tessadro patent (U.S. Patent No. 7,003,161), and/or the Acharya et al. patent (U.S. Patent No. 6,094,508). These contentions are addressed below. In view of the following remarks, reconsideration and allowance of the pending claims is respectfully requested.

(A) Claims 1, 3-16 and 34-35 are patentable over the cited references.

In rejecting claim 1 of the present application, the Office concedes that the Takahashi patent fails to disclose identifying a "substantially connected component" that includes "non-edge pixels," in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels, and relies on the Westman et al. reference for those features (*see* Office action at p. 6).

As explained in the previous response, the Westman et al. reference simply does not disclose or render obvious identifying a "substantially connected component" that includes "non-edge pixels," in which a number of the non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels. Rather, the Westman et al. reference discloses an image segmentation method that includes merging adjacent components containing *only* edge pixels.

In particular, the Westman et al. reference discloses that the image segmentation method is a multi-stage process, in which each successive stage "merges adjacent component regions of the previous stage" (*see* p. 796, ¶ 4). During the first stage, the image is segmented into "basic connected components" based on connectivity of adjacent pixels. During the second stage, the basic connected components from the first stage are merged in order to produce maximal connected components as part of an edge image (*id.* at p. 797, ¶ 4; FIGS. 2-4).

In rejecting claim 1, the Office alleges that the segmentation performed in this first stage corresponds to identifying a substantially connected component that includes non-edge pixels[1]. More specifically, the Office is understood to allege that a basic connected component in the Westman et al. reference corresponds to the claimed "substantially connected component" and that the basic connected component includes both of the claimed "non-edge pixels" and "edge pixels." This is incorrect. There is no disclosure in the cited portion of the Westman et al. reference that the basic connected component includes *non*-edge pixels, much less that it

[1] *See* Office action at p. 6, "Westman discloses a method for image segmentation (*see* abstract), which includes the step of identifying a substantially connected component that includes non-edge pixels and a plurality of substantially connected edge pixels being substantially connected to the selected edge pixels wherein the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels (*see* page 796, section 2, [p][005], lines 1-8)."

includes both edge pixels and non-edge pixels, as required by pending claim 1. Instead, the Westman et al. reference suggests, at most, that a basic connected component includes *only* edge pixels.

As the Westman et al. reference clearly discloses, computing a basic connected component is "based on connectivity simply of adjacent pixels" (*see* Westman et al. at p. 796, ¶ 4.). In other words, "[t]wo adjacent pixels…are connected if they are not separated by significant edges" (*id.* at p. 797, ¶ 3, emphasis added). Determining whether adjacent pixels are connected includes comparing a grey-level of a pixel or a color-space distance between adjacent pixels with a threshold "delta" (*i.e.*, pixels are merged based on a "boundary contrast") (*id.* at p. 796, ¶¶ 2, 5; p. 797, ¶ 1). If a pixel meets the threshold "delta" as defined, then the pixel is connected to an adjacent pixel in the basic connected component. If any pixel does not satisfy the threshold, however, the pixel is not connected to an adjacent pixel in the basic connected component and thus is not a part of the basic connected component. As a result, *every* pixel in the basic connected component therefore satisfies the threshold and is connected to an adjacent pixel in the component. Given that the foregoing technique is a method of edge detection and that the basic connected component represents a portion of an edge[2], it follows that every pixel in the basic component must correspond to an edge-pixel. Indeed, it would not be possible for any pixels in the basic connected component to be a non-edge pixel, as this would require including a pixel that failed to satisfy the threshold specified in the Westman et al. reference.

Nor is there any disclosure in the Westman et al. reference that the maximal connected components include non-edge pixels. Instead, the Westman et al. reference clearly discloses that the *same* procedure that is used to calculate the basic connected components is used to calculate the maximal connected components. In particular, adjacent basic connected components are merged based on a "boundary contrast" (defined by a threshold "epsilon" between the adjacent basic connected components (*see* p. 796, ¶ 6 to p. 797, ¶ 2)). If a basic connected component meets the threshold "epsilon," the basic connected component is connected to an adjacent basic connected component as part of a maximal connected component. Given that every pixel in a

[2] *Id.* at p. 797, ¶ 3, emphasis added: "Both stages of our Hierarchical Connected Component (HCC) analysis essentially involve edge detection…"

basic connected component is an edge pixel and each basic connected component is connected to another basic connected component in a maximal connected component, it follows that every pixel in a maximal connected component is connected and, therefore, corresponds to an edge pixel.

However, even if either the basic connected component or the maximal connected component included non-edge pixels (which is incorrect), the Westman et al. reference still fails to disclose that a "number" of non-edge pixels in either the basic connected component or the maximal connected component is "based on a level of tolerance for non-edge pixels," as further recited by pending claim 1. Instead, it merely discloses that each pixel or each basic connected component is compared to a specified threshold. There is no disclosure that a number of non-edge pixels is based on a level of tolerance. Accordingly, in view of the foregoing, it is clear that the Westman et al. reference fails to disclose a substantially connected component that includes edge pixels and non-edge pixels, in which the number of non-edge pixels is based on a level of tolerance, as recited in pending claim 1.

Nor does the Westman et al. reference support any reason to include non-edge pixels in either a basic connected component or a maximal connected component. Instead, as explained above, the Westman et al. reference discloses a method of producing an edge image that relies on pixels or components meeting a defined threshold. A person of ordinary skill in the art would have had no reason to modify the method disclosed in the Westman et al. reference, alone or in combination with the Takahashi patent, so as to obtain the claimed subject matter.

The Chang et al. reference discloses a method for finding connected components from binary images using a contour tracing technique (*see* Abstract). However, the relied upon portion of the Chang et al. reference is not understood to disclose or render obvious the features missing from the Takahashi et al. patent and the Westman et al. reference.

The Prakash et al. patent discloses a technique to segment an image that includes a multi-scale segmentation process operating on an image and a set of edge chains. Although the Prakash et al. patent discloses the use of an edge chain, the relied upon portion of the Prakash et

al. patent is not understood to disclose the features missing from the Takahashi patent and the Westman et al. reference.

The Huang et al. patent discloses a face recognition system that includes locating and extracting face regions belonging to known people from a set of model images, and determining the face pose for each of the face regions extracted (*see* Abstract). However, the relied upon portion of the Huang et al. patent is not understood to disclose the features of pending claim 1 that are missing from the Takahashi patent and from the Westman et al. reference.

The Noda et al. reference discloses an image synthesizing apparatus for producing a synthetic image that consists of a background image and at least a main image superimposed on the background image (*see* Abstract). However, the relied upon portion of the Noda et al. reference is not understood to disclose the features missing from the Takahashi patent and the Westman et al. reference.

The Curtright et al. patent discloses a computer-implemented method for generating digital map images of a uniform format that includes: cropping a bit mapped map image corresponding to a desired geographic area; moving the boundaries of the selected map image into a tessellated shape and then re-sizing the map image to contain a predetermined pixel area (*see* Abstract). The relied upon portion of the Curtright et al. patent is not understood to disclose the features missing from the Takahashi patent and the Westman et al. reference.

The Tessadro patent discloses a method to detect and locate an edge based on characteristics of the image, such as texture, intensity and color. However, the relied upon portion of the Tessadro patent is not understood to disclose the features missing from the Takahashi patent and the Westman et al. reference.

The Acharya et al. patent discloses a method for determining a threshold for edge detection based on local intensity information. However, the relied upon portion of the Acharya et al. patent is not understood to disclose the features missing from the Takahashi patent and the Westman et al. reference.

At least for the foregoing reasons, claim 1 should be allowed.

Claims 3-16 and 34-35 depend from claim 1 and should be allowed for at least the same reasons as claim 1.

In addition, the dependent claims also recite subject matter that is independently allowable. For example, claim 35 recites automatically determining the tolerance level for the non-edge pixels as a function of a spacing between the multiple objects in the image. The Office relies on the Acharya et al. patent for that feature.

The Acharya et al. patent discloses a method for defining a localization region of an image, which includes selecting a portion of the image and then automatically determining the threshold to be applied for edge detection within the localization region. The threshold is based on intensity information of pixels within the localization region (*see* col. 2, lines 53-59).

The relied upon portions of the Acharya et al. patent fail, however, to disclose or render obvious determining a tolerance level for non-edge pixels as a function of a spacing between objects in an image, as recited by pending claim 35. Instead, as explained above, the cited portions of the Acharya et al. patent simply disclose that a threshold for edge detection within a localization region, not a tolerance for non-edge pixels, is determined. Furthermore, the threshold is determined based on intensity information, not a spacing between objects in the image, as further recited by pending claim 35. Nor do the cited portions of the Acharya et al. patent support any reason to determine a tolerance level for non-edge pixels as a function of a spacing between multiple objects in an image.

At least for this additional reason, claim 35 should be allowed.

(B) Claims 17, 19-32 and 36-37 are patentable over the cited references.

Claim 17 recites a computer program product, tangibly stored on a computer-readable medium, for identifying multiple objects within an image, that includes instructions for identifying a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels.

None of the cited references, alone or in combination, discloses or renders obvious the subject matter of independent claim 17. As set forth in reference to claim 1, the cited references are not understood to disclose or suggest a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels is based on a level of tolerance for non-edge pixels.

Accordingly, claim 17 should be allowed. Claims 19-32 and 36-37 depend from claim 17 and should be allowed for at least the same reasons as claim 17.

(C) Claims 33 and 38-39 are patentable over the cited references.

Claim 33 recites a computer program product, tangibly stored on a computer-readable medium, for identifying multiple objects within a scanned image, that includes instructions for identifying a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge.

None of the cited references, alone or in combination, are understood to disclose or render obvious the subject matter of independent claim 33. There is no disclosure or suggestion in the cited references of identifying a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels.

At least for the foregoing reason, claim 33 should be allowed.

Claims 38-39 depend from claim 33 and should be allowed for at least the same reason as claim 33.

(D) Claims 40-54 are patentable over the cited references.

Independent claim 40 recites, in part, a system having a processor operable to perform operations including identifying a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels.

None of the cited references, alone or in combination, are understood to disclose or render obvious the subject matter of independent claim 40. There is no disclosure or suggestion in the cited references of a processor identifying a substantially connected component that includes non-edge pixels, in which the number of non-edge pixels in the substantially connected component is based on a level of tolerance for non-edge pixels.

At least for the foregoing reason, claim 40 should be allowed.

Claims 41-54 depend from claim 40 and should be allowed for at least the same reason as claim 40.

Conclusion

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

The Applicant respectfully requests that all pending claims be allowed.

No fee is believed due. However, please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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